

CLAIMS

What is claimed is:

1 1. A medical device for delivering a medicament to a patient,
2 comprising:

3 a syringe assembly comprising:

4 a barrel with a forward end and a rear end and defining a reservoir
5 within which the medicament may be contained;

6 a needle cannula having a forward tip and being coupled to said
7 forward end of said barrel and being in fluid communication with said reservoir; and

8 a plunger rod having a stopper arranged at one end of said plunger
9 rod and disposed in said reservoir, said plunger rod having a thumb pad arranged at the
10 other end thereof, said thumb pad being operable for receiving medicament delivery
11 pressure for causing said stopper to move within said reservoir to cause the
12 medicament to be expelled from said reservoir; and

13 a shield system comprising:

14 a first shield coupled to said forward end of said barrel;

15 a second shield movable from a first position to a second position;

16 an urging member urging said second shield toward said second
17 position;

18 a retaining device for holding said second shield in said first
19 position; and

20 a release mechanism for releasing said retaining device upon
21 insertion of said stopper in said barrel to a release mechanism deployment position;
22 wherein said forward tip of said needle cannula is at least partially
23 exposed for allowing delivery of the medicament to the patient when said second shield
24 is in said first position and said forward tip of said needle cannula tip is covered by said
25 second shield when said second shield is in said second position.

1 2. The medical device of claim 1, wherein said shield system is
2 arranged on said syringe assembly such that said shield system is positioned in front of
3 said reservoir so as not to visually obstruct said reservoir and the medicament held
4 therein.

1 3. The medical device of claim 1, wherein said second shield is
2 located in said first shield when said second shield is in said first position.

1 4. The medical device of claim 3, wherein said second shield
2 comprises a flange at an end of said second shield facing said barrel, said retaining
3 device acting on said flange for holding said second shield in said first position.

1 5. The medical device of claim 4, wherein said retaining device
2 comprises a flexible arm having a retaining member for interaction with said flange.

1 6. The medical device of claim 5, wherein said release mechanism
2 comprises a tubular element arranged on said needle cannula and sealingly inserted
3 with said needle cannula in an opening at said front of said barrel.

1 7. The medical device of claim 6, wherein said tubular element
2 extends into said barrel such that said stopper contacts said tubular element at a
3 contact position before said stopper is fully inserted in said barrel, said tubular element
4 being movable by said stopper as said stopper moves from said contact position to the
5 release mechanism deployment position, said tubular element forcing said flexible arm
6 of said retaining device radially outward when said tubular element is moved by said
7 stopper.

1 8. The medical device of claim 7, wherein said urging member is
2 arranged between said tubular element and said second shield.

1 9. The medical device of claim 7, wherein said tubular element
2 comprises a tubular portion and a flange portion arranged between two longitudinal
3 ends of said tubular portion, said tubular portion being molded from a rigid material for
4 supporting said needle cannula and said flange portion being molded from a flexible
5 material having a flexibility sufficient to provide a seal at the forward end of said barrel.

1 10. The medical device of claim 9, wherein said flange portion interacts
2 with said retaining device to release said second shield.

1 11. The medical device of claim 9, wherein said urging member is
2 arranged between said flange portion of said tubular element and said second shield.

1 12. The medical device of claim 4, wherein a front end of said first
2 shield comprises a lip for retaining the flange of said second shield at said second
3 position when said second shield is moved to said second position.

1 13. The medical device of claim 12, further comprising a locking device
2 for locking said second shield in said second position.

1 14. The shield system of claim 12, wherein said lip includes first and
2 second sections axially offset from each other for engaging said flange of said second
3 shield when said second shield is moved to said second position for causing
4 misalignment of said second shield with respect to a longitudinal axis of said needle
5 cannula.

1 15. The medical device of claim 13, wherein said locking device allows
2 said flange to pass said locking device as said second shield moves toward said second
3 position and prevents said second shield from moving back toward said first position
4 from said second position.

1 16. The medical device of claim 3, wherein said second shield
2 comprises an annular bump between first and second ends of said second shield,
3 wherein said retaining device comprises a lip arranged at a front end of said first shield
4 interacting with said annular bump.

1 17. The medical device of claim 16, wherein said release mechanism
2 comprises a tubular element arranged on said needle cannula and comprising a hub

3 portion facing said barrel, said stopper contacting said hub portion at a contact position
4 before said stopper is fully inserted in said barrel, said tubular element and hub being
5 longitudinally movable by said stopper when said stopper is moved from said contact
6 position to said fully inserted position in said barrel, said tubular element moving said
7 second shield such that said annular bump passes said lip to release said second shield
8 when said stopper is fully inserted.

1 18. The medical device of claim 1, wherein said barrel comprises a
2 cylindrical barrel portion, a front cylindrical portion having a different diameter than said
3 cylindrical barrel portion, and a transition portion between said front cylindrical portion
4 and said cylindrical barrel portion.

1 19. The medical device of claim 18, wherein said release mechanism
2 comprises a tubular element arranged on said needle cannula and sealingly inserted
3 with said needle cannula in an opening defined by said front cylindrical portion.

1 20. The medical device of claim 19, wherein said first shield is
2 connected on an outer surface of said front cylindrical portion.

1 21. The medical device of claim 20, wherein said cylindrical barrel
2 portion is made from a plastic material.

1 22. The medical device of claim 20, wherein said cylindrical barrel
2 portion is made from a glass material.

1 23. The medical device of claim 20, wherein said cylindrical barrel
2 portion is made from a glass material and said front cylindrical portion is made from a
3 plastic material.

1 24. The medical device of claim 20, wherein said first shield is
2 connected to said outer surface of said front cylindrical portion by one of a snap-fit
3 connection, an adhesive, threading, welding, and a heat stake.

1 25. A combination comprising a syringe assembly for delivery of a
2 medicament to a patient, and a shield system for use with said syringe assembly;

3 wherein said syringe assembly comprises a barrel having a forward end
4 and a rear end and defining a reservoir within which the medicament may be contained,
5 a needle cannula having a forward tip and coupled to said forward end of said barrel,
6 said needle cannula being in fluid communication with said reservoir, and a plunger rod
7 having a stopper arranged at one end of said plunger rod and disposed in said
8 reservoir, said plunger rod having a thumb pad arranged at the other end thereof, said
9 thumb pad being operable for receiving medicament delivery pressure for causing said
10 stopper to move within said reservoir to cause the medicament to be expelled from said
11 reservoir; and

12 wherein said shield system comprises a first shield coupled to said
13 forward end of said barrel, a second shield movable from a first position to a second
14 position, an urging member urging said second shield toward said second position, a
15 retaining device for holding said second shield in said first position, and a release

16 mechanism for releasing said retaining device upon insertion of said stopper in said
17 barrel to a release mechanism deployment position;

18 wherein, said needle cannula is at least partially exposed for allowing
19 delivery of the medicament to the patient when said second shield is in said first position
20 and said forward tip of said needle cannula tip is covered by said second shield when
21 said second shield is in said second position.

1 26. The combination of claim 25, wherein said barrel comprises a
2 cylindrical barrel portion, a front cylindrical portion having a different diameter than said
3 cylindrical barrel portion, and a transition portion between said front cylindrical portion
4 and said cylindrical barrel portion.

1 27. The combination of claim 26, wherein said release mechanism
2 comprises a tubular element arranged on said needle cannula and sealingly inserted
3 with said needle cannula in an opening defined by said front cylindrical portion.

1 28. The combination of claim 27, wherein said first shield is connected
2 to an outer surface of said front cylindrical portion.

1 29. The combination of claim 28, wherein said cylindrical barrel portion
2 is made from a plastic material.

1 30. The combination of claim 28, wherein said cylindrical barrel portion
2 is made from a glass material.

1 31. The combination of claim 28, wherein said cylindrical barrel portion
2 is made from a glass material and said front cylindrical portion is made from a plastic
3 material.

1 32. A shield system for connection to a syringe barrel for preventing
2 inadvertent needle sticks after use of the syringe, the shield system comprising a first
3 shield having a first end coupled to a front end of the syringe barrel, a second shield
4 movable from a first position to a second position, an urging member urging said
5 second shield toward said second position, a retaining device for holding said second
6 shield in said first position, and a release mechanism for releasing said retaining device
7 upon insertion of a syringe stopper into the syringe barrel to a release mechanism
8 deployment position for allowing said urging member to move said second shield to said
9 second position to cover a tip of a needle cannula connected to said forward end of the
10 syringe barrel.

1 33. The shield system of claim 32, wherein said second shield is
2 located in said first shield when said second shield is in said first position.

1 34. The shield system of claim 33, wherein said second shield
2 comprises a flange at an end of said second shield facing said barrel, said retaining
3 device acting on said flange for holding said second shield in said first position.

1 35. The shield system of claim 34, wherein said retaining device
2 comprises a flexible arm having a retaining element for interaction with said flange.

1 36. The shield system of claim 35, wherein said release mechanism
2 comprises a tubular element arranged on the needle cannula and sealingly inserted with
3 said needle cannula in an opening at the front end of the syringe barrel.

1 37. The shield system of claim 36, wherein said urging member is
2 arranged between said tubular element and said second shield.

1 38. The shield system of claim 34, wherein a front end of said first
2 shield comprises a lip for retaining said flange of said second shield at said second
3 position when said second shield is moved to said second position.

1 39. The shield system of claim 38, further comprising a locking device
2 for locking said second shield in said second position.

1 40. The shield system of claim 39, wherein said locking device allows
2 said flange to pass said locking device as said second shield moves toward said second
3 position and prevents said second shield from moving back toward said first position
4 from said second position.

1 41. The shield system of claim 33, wherein said second shield
2 comprises an annular bump between first and second ends of said second shield,
3 wherein said retaining device comprises a lip arranged at a front end of said first shield
4 interacting with said annular bump.

1 42. The shield system of claim 38, wherein said lip includes first and
2 second sections axially offset from each other for engaging said flange of said second
3 shield when said second shield is moved to said second position for causing
4 misalignment of said second shield with respect to a longitudinal axis of said needle
5 cannula.

1 43. A medical device for delivering a medicament to a patient,
2 comprising:

3 a syringe assembly comprising:

4 a barrel with a forward end and a rear end and defining a reservoir
5 within which the medicament may be contained;

6 a needle cannula having a forward tip and being coupled to said
7 forward end of said barrel and being in fluid communication with said reservoir; and

8 a plunger rod having a stopper arranged at one end of said plunger
9 rod and disposed in said reservoir, said plunger rod having a thumb pad arranged at the
10 other end thereof, said thumb pad being operable for receiving medicament delivery
11 pressure for causing said stopper to move within said reservoir to cause the
12 medicament to be expelled from said reservoir; and

13 a shield system comprising:

14 a first shield coupled to said forward end of said barrel;

15 a second shield movable from a first position to a second position;

16 means for urging said second shield toward said second position;

17 means for retaining said second shield in said first position; and

18 means for releasing said retaining means upon insertion of said
19 stopper in said barrel to a deployment position;
20 wherein said forward tip of said needle cannula is at least partially
21 exposed for allowing delivery of the medicament to the patient when said second shield
22 is in said first position and said forward tip of said needle cannula tip is covered by said
23 second shield when said second shield is in said second position.